

ATMOSPHERIC CHEMISTRY SAMPLING WITH POWERSONDES



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Introduction

- Original idea was to develop Glidersonde
- To make flight computer development easier a few Glidersondes were built with engines
- The little planes quickly grew bigger and became known as the Powersonde.
- Powersondes were first used in field experiments
 - where gas and balloon filling equipment was not readily available
 - To do meteorological soundings

Powersonde

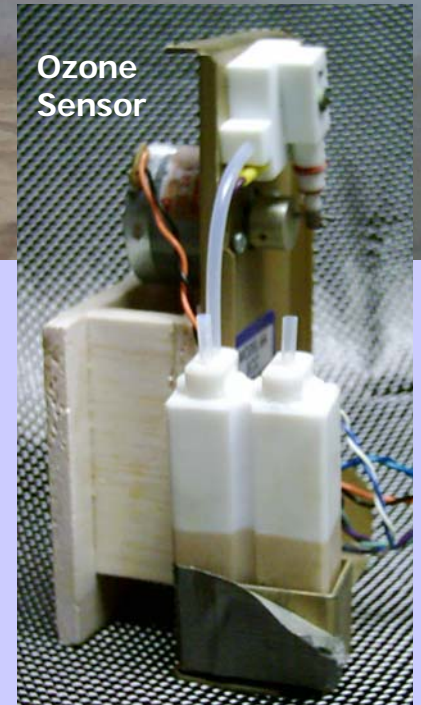
- Wingspan: 2,6m
- Length: 1,9 m
- Weight: ~10kg
- Engine: 40cc two stroke petrol
- Endurance: 1 hour
- Maximum altitude: 12 000'



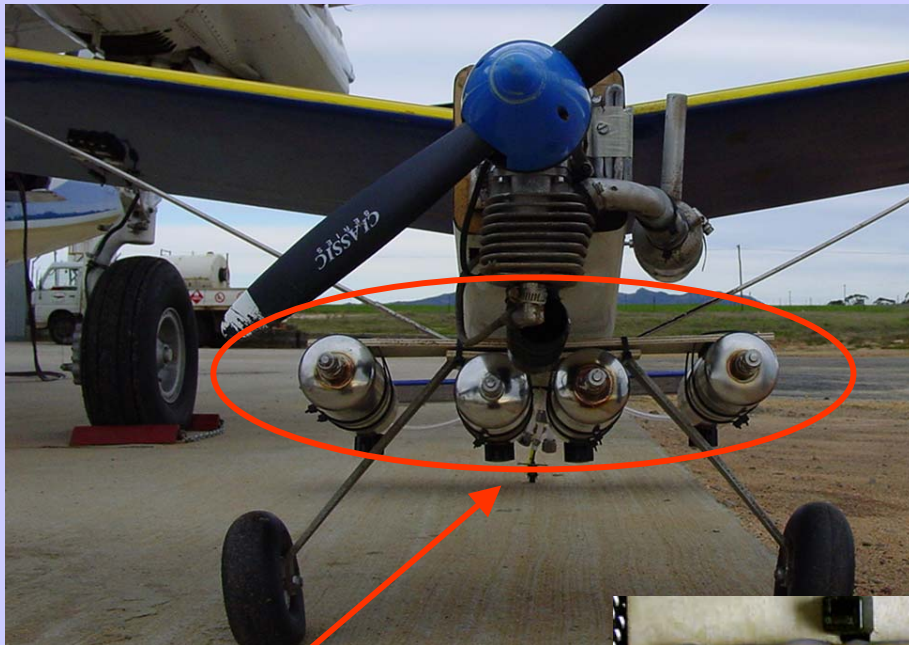
Cape Town Brown Haze 2003

- The Climatology Research Group at WITS University acquire a Powersonde for the project
- First of its kind
 - Radiosonde sensor package was replaced by miniature Automatic Weather Station
 - Electrochemical Cell with 12V pump added for Ozone measurement.

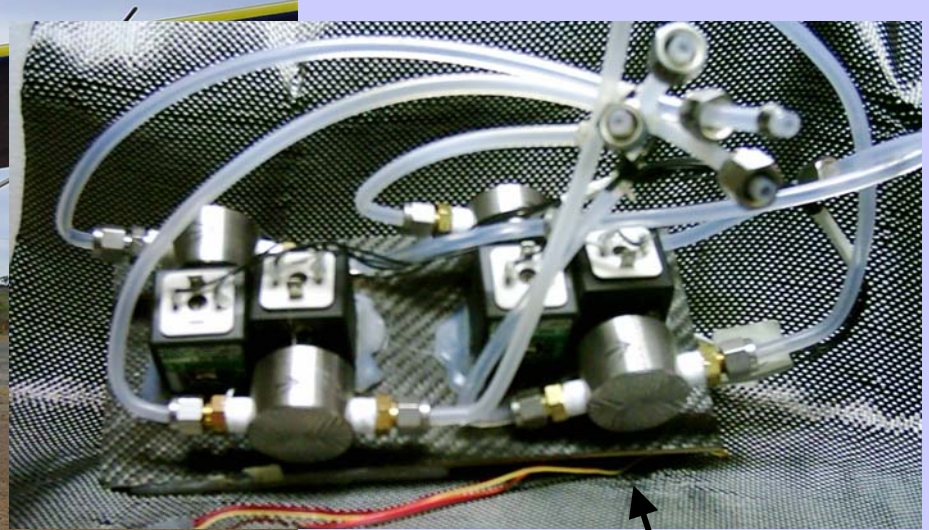
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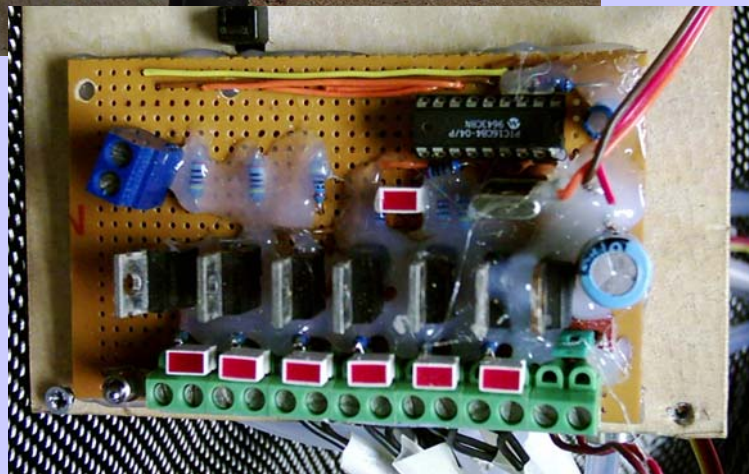


500 ml VOC Canisters



Valves

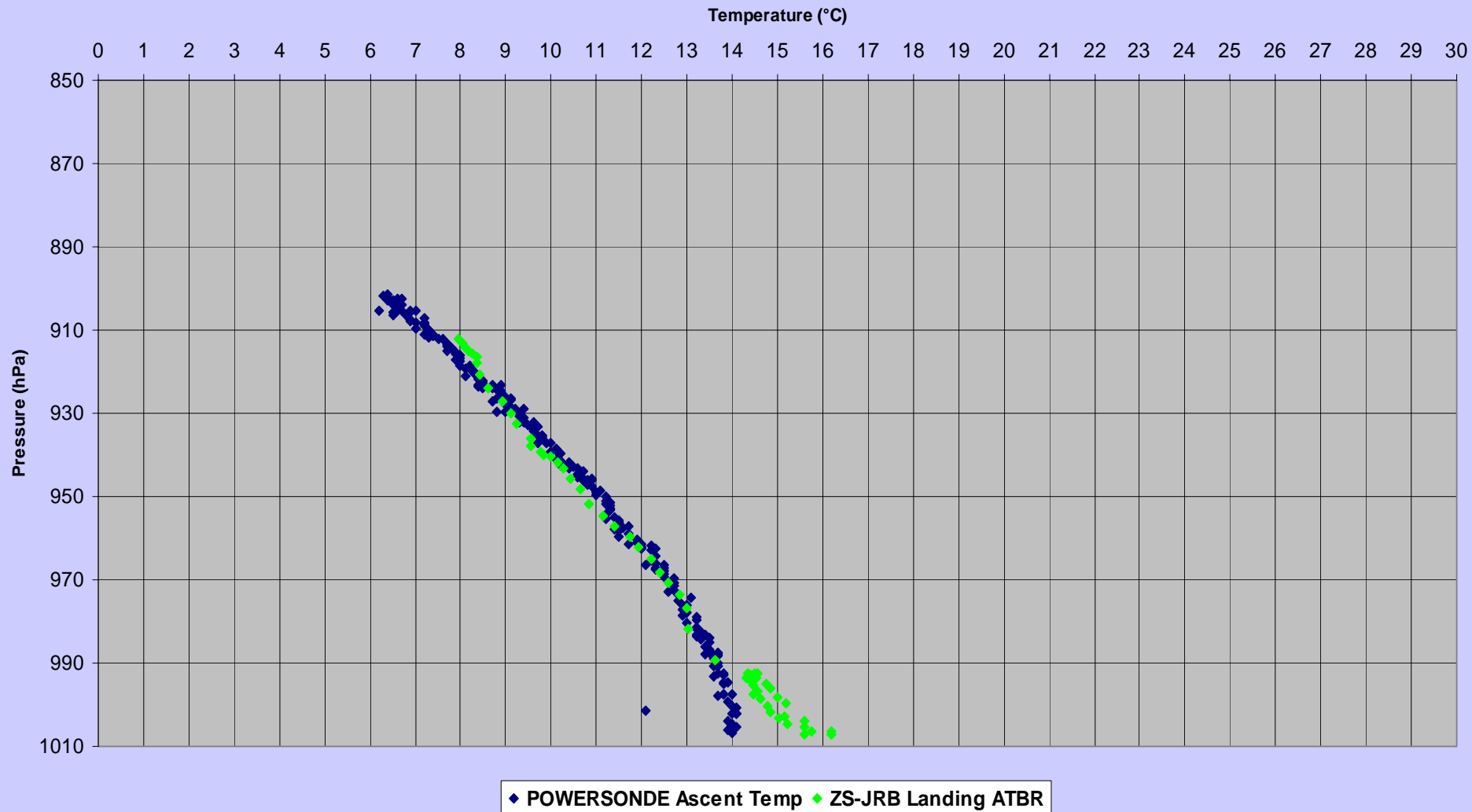
Valve control unit →



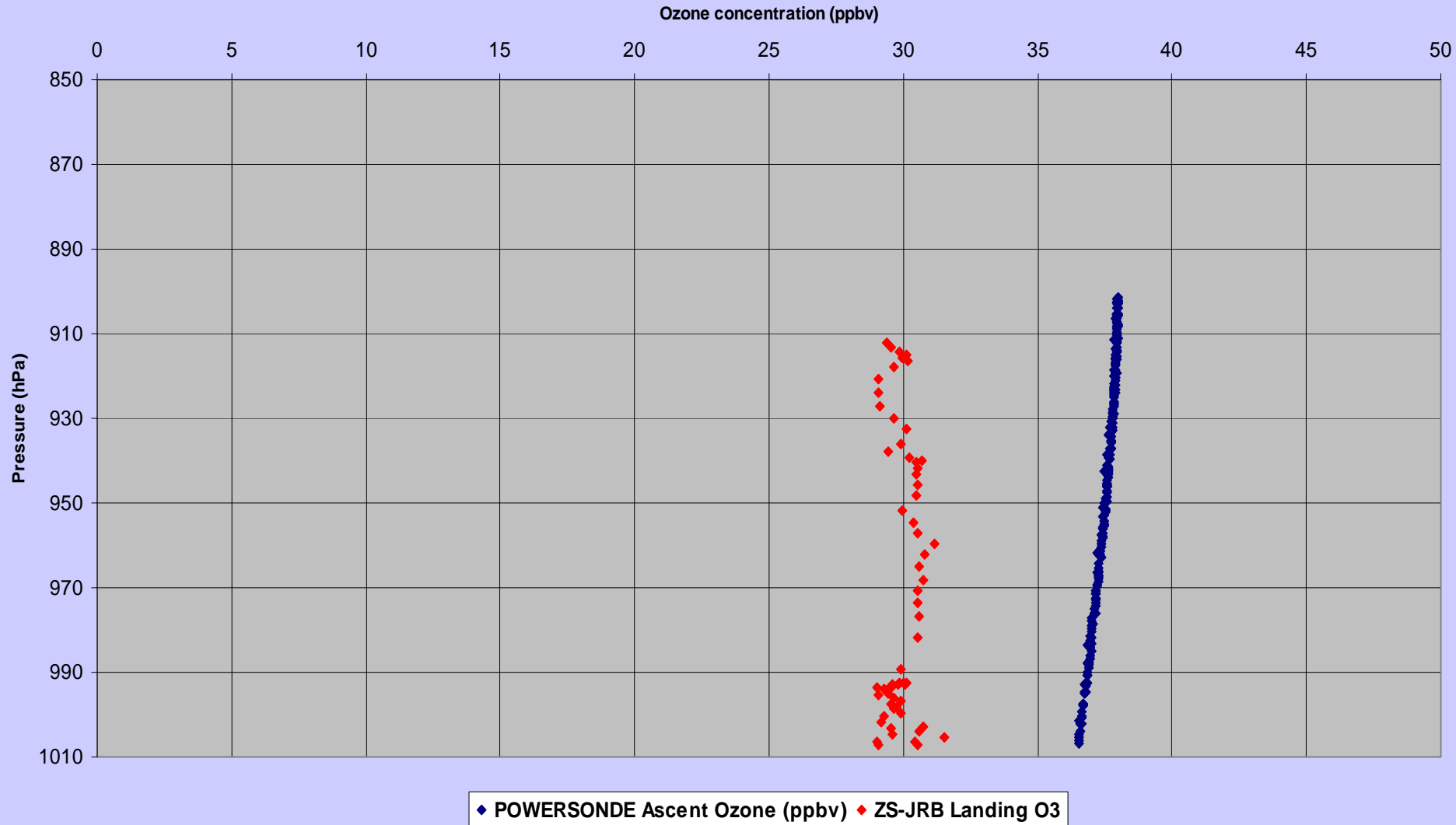
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Temperature data: ZS-JRB vs. Powersonde



Ozone data: ZS-JRB vs. Powersonde



Lessons learnt in 2003

- Outlet of temperature probe was too small
 - Slow response time – particularly on down cycle
- Electrochemical Cell of ozone instrument has limited lifetime – requires more frequent recalibration
- Wing fence needs to be put on at about half span
 - Prevents contamination of Volatile Organic Carbons (VOC) samples by engine
 - Improves lifting ability of wing

The next step

- Giantsonde
 - 3,8m wingspan
 - Payload capacity ~20kg
 - Equipped with:
 - Mini AWS
 - Electrochemical Cell with pump
 - 8 VOC canisters
 - Laser particle counter
 - Camera

Giantsonde



Future projects

- Biogenic VOC sampling in Botswana
November 2003
- Industrial aerosol sampling
 - Flying into plumes
 - Flying in vicinity of industries
- Photographing areas where sampling is done
- Miniaturization of more instruments
 - SO, SO₂
 - NO, NOS, NO_x
 - CO, CO₂

Contacts

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